IN THE CLAIMS

Claim 1. (currently amended) An automatic gain adjustment device of a feedback control system that uses a phase difference between an output signal obtained from a controlled object and an input signal while controlling the object based on the input signal, the automatic gain adjustment device comprising:

a disturbance generator for generating the input signal; the input signal being a sine wave of a predetermined frequency;

phase shifting means connected to an input stage of the feedback control system for shifting a phase of the input signal such that a phase shift amount of the phase shifting means is set so that a frequency of the input signal to be supplied to a closed loop coincides with a crossover frequency at which an open loop gain of the feedback control system becomes 0 db;

a band-pass filter for filtering the output signal to extract a component signal of the predetermined frequency;

a multiplier for multiplying the phase-shifted input signal from the phase shifting means and the ~~output~~ component signal ~~obtained~~ from the band-pass filter~~controlled object~~;

an integrator for integrating product results of the multiplier over one cycle at the predetermined frequency and outputting integrated product results; and

a gain setting unit for adjusting a gain of the feedback control system based on a sign of the integrated product results from the integrator so that the open loop gain converges to 0 dB.

Claim 2. (canceled)

Claim 3. (previously presented) The automatic gain adjustment device according to claim 1, wherein the open loop gain is converged to 0 dB using a bisection method.

Claim 4. (currently amended) An automatic gain adjustment method for a feedback control system that uses a phase difference between an output signal obtained from a controlled object and an input signal while controlling the object based on the input signal, the automatic gain adjustment method comprising the steps of:

generating the input signal using a disturbance generator; the input signal being a sine wave of a predetermined frequency;

setting a phase shift amount so that a frequency of the input signal to be supplied to a closed loop coincides with a crossover frequency at which an open loop gain of the feedback control system becomes 0 dB;

shifting a phase of the input signal based on the phase shift amount set in said step of setting;

band-pass filtering the output signal to extract a component signal of the predetermined frequency;

multiplying the phase-shifted input signal and the component~~output~~ signal ~~obtained from the controlled object~~;

integrating product results of the multiplying step over one cycle at the predetermined frequency~~of multiplying~~; and

adjusting a gain of the feedback control system based on a sign of the integrated product results so that the open loop gain converges to 0 dB.

Claim 5. (canceled)

Claim 6. (previously presented) The automatic gain adjustment method according to claim 4, wherein the open loop gain is converged to 0 dB using a bisection method.